XL.—*Note on the assumed Relationship of* Parkeria *to* Stromatopora, *and on a Microscopic Section of* Stromatopora mamillata, *Fr. Schmidt.* By H. J. Carter, F.R.S. &c.

In 1877 ('Annals,' vol. xix. p. 55 *et seq.*) I made it plain (at all events to myself) that *Parkeria* was neither a species of Foraminifera nor one of Spongida; and at p. 61 (*ib.*) began to compare the structure of *Parkeria* with that of *Stromatopora*, meaning that stromatoporoid organism of the Devonian Limestone called by Phillips "*Caunopora placenta*," which was originally described by Lonsdale under the name of "*Coscinopora placenta.*" But subsequently, that is in 1879 ('Annals,' vol. iv. p. 101 *et seq.*), I found that *Caunopora* must be considered as an instance of "symbiosis," in which the vertical tubes belonged to one organism and the stromatoporoid mass in which they are imbedded to another, probably both allied to the Hydroida; thus my comparison of the "vertical tubes" of *Caunopora* with those of *Parkeria* became inadmissible, and the nature of the animal of *Parkeria* was still left open for conjecture.

To assume that *Parkeria* was not a Hydroid because the skeletal structure of the former was probably calcareous and not chitinous would be equally inadmissible, because *Hydractinia calcarea* affords a living instance to the contrary, to say nothing of the fossil species, viz. *H. pliocena* ('Annals,' 1877, vol. xix. p. 50) and *H. Kingii* (*ib.* 1878, vol. i. p. 301), both of which are of considerable thickness. Thus, prevalent as the chitinous skeleton is among the Hydroida, there are instances of calcareous ones in which the structure *mutatis mutandis* is the same; but to this I shall presently recur more particularly.

Meanwhile fossil specimens of massive Polyzoa from the Coralline Crag of Suffolk have been presented to me to show how much their general form, structure, and mode of growth resembles that of *Parkeria*; that is, they are hemispherical masses with nodular segmented surface, radiating structure, and concentric lines of intervals or chambers (analogous to the "chamberlets" in *Parkeria*), all growing from a central point and furnished with an epithecal investment. But, while the segments are composed of little groups or masses of *parallel tubes in juxtaposition*, which groups are separated in the direction of the radiation by the intervening of the "chambers," and each mass is based upon an epithecal layer of amorphous substance which extends more or less up the sides, thus forming the ceiling of the *empty* "chamber," whose floor, on the other hand, consists of the open mouths of the tubes in juxtaposition, as seen on the surface of the fossil, the *whole* of the structure of *Parkeria* is elaborated out of tissue composed of anastomosing, reticulated and vermiculated, solid, calcareous thread in which there is no epithecal or other differentiation whatever beyond form; that is to say, that although this tissue is traversed by *distinct* tubes which radiate in broken lines from the centre to the circumference (passing *through* the chambers in an isolated manner, that is, separated for some distance from each other without any intervening substance, which chambers, as before stated, are *empty* in the fossil Polyzoa from the Coralline Crag), the tubes themselves of *Parkeria* are composed of the same reticulated tissue as the rest of the fossil. In both instances, of course, these calcareous structures respectively represent the skeletal or hard parts, while the intervals were occupied by the soft parts of the animal.

Again, the embryo or commencement of *Parkeria* seems to have settled, for development, on a loose or rolling fragment of foreign material, whence the future growth became more or less spherical, often including in its progress small Foraminifera and other particles of foreign matter, as may be seen by the vertical sections.

Thus the resemblance of the fossilized Polyzoa of the Crag to *Parkeria* is reduced to the general structure, while the elementary structure is *totally* different.

Where *Parkeria* looks most like the fossilized forms of the Polyzoa from the Crag is in the solidified specimens, that is, where the cavities originally occupied by the flesh or soft parts have been filled up with calcite; but this is not the condition in which the comparison should be made, seeing that, in many instances when the *Parkeria* is broken with a hammer, more or less of the interior comes out in a large spherical form or nucleus, like a nut from its shell, wherein the whole of the calcite, which in the solidified specimens fills the intervals originally occupied by the soft parts, is absent, and therefore nothing but the tissue formed of the anastomosing, reticulated, skeletal thread, now incrusted with minute crystals of calcite through fossilization, remains, which nucleus, on being picked to pieces as much as may be required, can be most satisfactorily studied, and then it is that the great difference which exists between it and the fossilized Polyzoa of the Coralline Crag can be fully realized. Indeed, in this condition, the skeletal part can be more satisfactorily studied even than in the living animal, when the whole of the skeleton was probably imbedded in flesh.

But whether the reticulated tissue of anastomosing, vermiculated thread be infiltrated or not, the distinction between the tubes and this tissue is equally manifest, from the small size of the meshes of the latter contrasted with the much larger size and scattered position of the former, either on the surface of the fossil or in the vertical section, as they traverse the chamber; at the same time if the surface *alone* be examined, then it *does* resemble that of the Polyzoa called "*Heteropora*" (large and small tubes together); but this impression is soon corrected by an examination of the *un*infiltrated or *un*consolidated specimen, when the "tubes," which on the surface look like *Heteropora*, are seen to be separated by an intervening structure that, to my knowledge, hitherto has, in no shape, ever been found to occur with the cells of the Polyzoa.

What, then, was the form of the animal that inhabited these tubes in the midst of the elementary structure of *Parkeria*, which is so totally different from that of the fossilized Polyzoa of the Coralline Crag, to which I might add those of the Coral Rag and the recent species of branched coralliform polyzoon, called "*Heteropora*," from New Zealand?

This question throws us back again upon the Hydroida, to which I have before alluded as presenting in the *calcareous* form the only kind of reticulated tissue mixed with large tubes (the calicles) for the use of the polyps or hydranths which have any direct resemblance to the structure of *Parkeria* (see 'Annals,' 1877, vol. xix. p. 50, pl. viii. fig. 5, &c.).

If we assume that *Parkeria* was a polyzoon, then it must be entirely upon general resemblance and form, but not at all upon the elementary structure; hence the assumption must be so far *simply* conjectural; while if we assume that it was a Hydroid, then we have in addition an almost identity in elementary structure to go upon for our assumption, and this being, under the circumstances, of *the more* consequence of the two, must be considered the more tenable. Besides, we have the instance of *Chitina ericopsis* ('Annals,' 1873, vol. xi. p. 13), which, although dendritic in general form, is identical in tissue with *Parkeria*, that is, the whole is elaborated out of a mass of continuous, anastomosing, reticulated, and vermiculated thread, without differentiation in any part beyond mere form; and although there are no "chambers" here to be traversed by the "tubes," as in *Parkeria*, their analogues are to be seen in the form of hollow cylindrical processes or hydrothecæ at the *ends* of the branches, which tubes are composed of the same tissue and originally contained the polyps or hydranths. Now, were this "thread" calcareous instead of chitinous, as it *is* in *Hydractinia calcarea*, then the identity in structure with *Parkeria* would be so far complete.

Thus, although *Parkeria* cannot be identified with *Caunopora*, there is still no reason whatever why it should not be indirectly connected through *Hydractinia* with *Stromatopora* by being a Hydroid, if I am right in assuming that the animal of the latter was of this nature ('Annals,' 1878, vol. ii. p. 304 &c.).

With reference to the examination of the microscopic section of *Stromatopora mamillata*, Fr. Schmidt (Rosen, "Ueber die Stromatoporen," p. 71 &c., Taf. viii.), I have only to repeat what Nicholson and Murie, in their excellent memoir, have already stated, viz. that the skeleton of *Stromatopora* is "composed of non-spicular, granular, calcareous matter" (Linn. Soc. Journ. Zool. 1878, vol. xiv. p. 241).

Selecting a rolled portion, from the "Parson and Clerk" rocks at Teignmouth, of the species above mentioned, in which the so-called "hexactinellid structure" is sharply defined, I thought, as I had lately been successful in bringing out the spicules of the fossilized Calcispongiæ of the Coral Rag from Faringdon, that I might be equally successful in doing so with *Stromatopora* under similar circumstances, if there were any present; but although the slice was reduced almost to transparency, the skeletal fibre of the *Stromatopora* throughout never presented any thing but a granular composition, the minute grains of which contrasted strongly with the clear rhomboid crystalline calcspar of the intervening spaces, without the most remote trace of any kind of sponge-spicule in any part.

XLI.—*Contributions towards a General History of the Marine Polyzoa.* By the Rev. THOMAS HINCKS, B.A., F.R.S.

[Continued from vol. xi. p. 202.]

[Plates XIII. & XIV.]

XII. POLYZOA FROM INDIA (coast of Burmah).

A small gathering of Polyzoa from an island in the Mergui Archipelago, off the coast of Burmah, obtained by Dr. J. Anderson, F.R.S., Superintendent of the Indian Museum, Calcutta, has been placed in my hands for examination by